<110> Apicella, Michael A.
      Edwards, Jennifer L.

<120> Vaccine and compositions for the prevention and treatment of Neisserial
      infections

<130> 875.0096US1

<150> US 10/621,184
<151> 2003-07-15

<150> US 10/066,551
<151> 2002-01-31

<150> US 60/344,452
<151> 2001-10-23

<150> US 60/310,356
<151> 2001-08-06

<150> US 60/266,070
<151> 2001-01-31

<160> 32

<170> FastSEQ for Windows Version 4.0

<210> 1
<211> 2015
<212> PRT
<213> Neisseria gonorrhoeae

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Met Asn Lys Gly Leu His Arg Ile Ile Phe Ser Lys Lys His Ser Thr
 1   5   10   15
Met Val Ala Val Ala Glu Thr Ala Asn Ser Gln Gly Lys Gly Lys Gln
                20   25   30
Ala Gly Ser Ser Val Ser Val Ser Leu Lys Thr Ser Gly Asp Leu Cys
            35   40   45
Gly Lys Leu Lys Thr Thr Leu Lys Thr Leu Val Cys Ser Leu Val Ser
        50   55   60
Leu Ser Met Val Leu Pro Ala His Ala Gln Ile Thr Thr Asp Lys Ser
65   70   75   80
Ala Pro Lys Asn Gln Gln Val Val Ile Leu Lys Thr Asn Thr Gly Ala
                85   90   95
Pro Leu Val Asn Ile Gln Thr Pro Asn Gly Arg Gly Leu Ser His Asn
                100   105   110
Arg Tyr Thr Gln Phe Asp Val Asp Asn Lys Gly Ala Val Leu Asn Asn
        115   120   125
Asp Arg Asn Asn Asn Pro Phe Leu Val Lys Gly Ser Ala Gln Leu Ile
        130   135   140
Leu Asn Glu Val Arg Gly Thr Ala Ser Lys Leu Asn Gly Ile Val Thr
145   150   155   160
Val Gly Gly Gln Lys Ala Asp Val Ile Ile Ala Asn Pro Asn Gly Ile
                165   170   175
Thr Val Asn Gly Gly Gly Phe Lys Asn Val Gly Arg Gly Ile Leu Thr
                180   185   190
Ile Gly Ala Pro Gln Ile Gly Lys Asp Gly Ala Leu Thr Gly Phe Asp
            195   200   205

```
Val Arg Gln Gly Thr Leu Thr Val Gly Ala Ala Gly Trp Asn Asp Lys
    210                 215                 220
Gly Gly Ala Asp Tyr Thr Gly Val Leu Ala Arg Ala Val Ala Leu Gln
225                 230                 235                 240
Gly Lys Leu Gln Gly Lys Asn Leu Ala Val Ser Thr Gly Pro Gln Lys
                245                 250                 255
Val Asp Tyr Ala Ser Gly Glu Ile Ser Ala Gly Thr Ala Ala Gly Thr
            260                 265                 270
Lys Pro Thr Ile Ala Leu Asp Thr Ala Ala Leu Gly Gly Met Tyr Ala
        275                 280                 285
Asp Ser Ile Thr Leu Ile Ala Asn Glu Lys Gly Val Gly Val Lys Asn
    290                 295                 300
Ala Gly Thr Leu Glu Ala Ala Lys Gln Leu Ile Val Thr Ser Ser Gly
305                 310                 315                 320
Arg Ile Glu Asn Ser Gly Arg Ile Ala Thr Thr Ala Asp Gly Thr Glu
                325                 330                 335
Ala Ser Pro Thr Tyr Leu Ser Ile Glu Thr Thr Glu Lys Gly Ala Ala
            340                 345                 350
Gly Thr Phe Ile Ser Asn Gly Gly Arg Ile Glu Ser Lys Gly Leu Leu
            355                 360                 365
Val Ile Glu Thr Gly Glu Asp Ile Ser Leu Arg Asn Gly Ala Val Val
    370                 375                 380
Gln Asn Asn Gly Ser Arg Pro Ala Thr Thr Val Leu Asn Ala Gly His
385                 390                 395                 400
Asn Leu Val Ile Glu Ser Lys Thr Asn Val Asn Asn Ala Lys Gly Ser
                405                 410                 415
Ala Asn Leu Ser Ala Gly Gly Arg Thr Thr Ile Asn Asp Ala Thr Ile
            420                 425                 430
Gln Ala Gly Ser Ser Val Tyr Ser Ser Thr Lys Gly Asp Thr Glu Leu
        435                 440                 445
Gly Glu Asn Thr Arg Ile Ile Ala Glu Asn Val Thr Val Leu Ser Asn
    450                 455                 460
Gly Ser Ile Gly Ser Ala Ala Val Ile Glu Ala Lys Asp Thr Ala His
465                 470                 475                 480
Ile Glu Ser Gly Lys Pro Leu Ser Leu Glu Thr Ser Thr Val Ala Ser
                485                 490                 495
Asn Ile Arg Leu Asn Asn Gly Asn Ile Lys Gly Gly Lys Gln Leu Ala
            500                 505                 510
Leu Leu Ala Asp Asp Asn Ile Thr Ala Lys Thr Thr Asn Leu Asn Thr
        515                 520                 525
Pro Gly Asn Leu Tyr Val His Thr Gly Lys Asp Leu Asn Leu Asn Val
    530                 535                 540
Asp Lys Asp Leu Ser Ala Ala Ser Ile His Leu Lys Ser Asp Asn Ala
545                 550                 555                 560
Ala His Ile Thr Gly Thr Ser Lys Thr Leu Thr Ala Ser Lys Asp Met
                565                 570                 575
Gly Val Glu Ala Gly Leu Leu Asn Val Thr Asn Thr Asn Leu Arg Thr
            580                 585                 590
Asn Ser Gly Asn Leu His Ile Gln Ala Ala Lys Gly Asn Ile Gln Leu
        595                 600                 605
Arg Asn Thr Lys Leu Asn Ala Ala Lys Ala Leu Glu Thr Thr Ala Leu
    610                 615                 620
Gln Gly Asn Ile Val Ser Asp Gly Leu His Ala Val Ser Ala Asp Gly
625                 630                 635                 640
His Val Ser Leu Leu Ala Asn Gly Asn Ala Asp Phe Thr Gly His Asn
                645                 650                 655
Thr Leu Thr Ala Lys Ala Asp Val Asn Ala Gly Ser Val Gly Lys Gly
            660                 665                 670
Arg Leu Lys Ala Asp Asn Thr Asn Ile Thr Ser Ser Ser Gly Asp Ile
        675                 680                 685
Thr Leu Val Ala Gly Asn Gly Ile Gln Leu Gly Asp Gly Lys Gln Arg
    690                 695                 700
```

2

Asn Ser Ile Asn Gly Lys His Ile Ser Ile Lys Asn Asn Gly Gly Asn
705   710   715   720
Ala Asp Leu Lys Asn Leu Asn Val His Ala Lys Ser Gly Ala Leu Asn
                  725   730   735
Ile His Ser Asp Arg Ala Leu Ser Ile Glu Asn Thr Lys Leu Glu Ser
                  740   745   750
Thr His Asn Thr His Leu Asn Ala Gln His Glu Arg Val Thr Leu Asn
            755   760   765
Gln Val Asp Ala Tyr Ala His Arg His Leu Ser Ile Thr Gly Ser Gln
      770   775   780
Ile Trp Gln Asn Asp Lys Leu Pro Ser Ala Asn Lys Leu Val Ala Asn
785   790   795   800
Gly Val Leu Ala Leu Asn Ala Arg Tyr Ser Gln Ile Ala Asp Asn Thr
                  805   810   815
Thr Leu Arg Ala Gly Ala Ile Asn Leu Thr Ala Gly Thr Ala Leu Val
            820   825   830
Lys Arg Gly Asn Ile Asn Trp Ser Thr Val Ser Thr Lys Thr Leu Glu
      835   840   845
Asp Asn Ala Glu Leu Lys Pro Leu Ala Gly Arg Leu Asn Ile Glu Ala
      850   855   860
Gly Ser Gly Thr Leu Thr Ile Glu Pro Ala Asn Arg Ile Ser Ala His
865   870   875   880
Thr Asp Leu Ser Ile Lys Thr Gly Gly Lys Leu Leu Leu Ser Ala Lys
                  885   890   895
Gly Gly Asn Ala Gly Ala Pro Ser Ala Gln Val Ser Ser Leu Glu Ala
            900   905   910
Lys Gly Asn Ile Arg Leu Val Thr Gly Glu Thr Asp Leu Arg Gly Ser
      915   920   925
Lys Ile Thr Ala Gly Lys Asn Leu Val Val Ala Thr Thr Lys Gly Lys
      930   935   940
Leu Asn Ile Glu Ala Val Asn Asn Ser Phe Ser Asn Tyr Phe Pro Thr
945   950   955   960
Gln Lys Ala Ala Glu Leu Asn Gln Lys Ser Lys Glu Leu Glu Gln Gln
                  965   970   975
Ile Ala Gln Leu Lys Lys Ser Ser Pro Lys Ser Lys Leu Ile Pro Thr
            980   985   990
Leu Gln Glu Glu Arg Asp Arg Leu Ala Phe Tyr Ile Gln Ala Ile Asn
      995   1000   1005
Lys Glu Val Lys Gly Lys Lys Pro Lys Gly Lys Glu Tyr Leu Gln Ala
      1010   1015   1020
Lys Leu Ser Ala Gln Asn Ile Asp Leu Ile Ser Ala Gln Gly Ile Glu
1025   1030   1035   1040
Ile Ser Gly Ser Asp Ile Thr Ala Ser Lys Lys Leu Asn Leu His Ala
                  1045   1050   1055
Ala Gly Val Leu Pro Lys Ala Ala Asp Ser Glu Ala Ala Ala Ile Leu
            1060   1065   1070
Ile Asp Gly Ile Thr Asp Gln Tyr Glu Ile Gly Lys Pro Thr Tyr Lys
      1075   1080   1085
Ser His Tyr Asp Lys Ala Ala Leu Asn Lys Pro Ser Arg Leu Thr Gly
      1090   1095   1100
Arg Thr Gly Val Ser Ile His Ala Ala Ala Ala Leu Asp Asp Ala Arg
1105   1110   1115   1120
Ile Ile Ile Gly Ala Ser Glu Ile Lys Ala Pro Ser Gly Ser Ile Asp
                  1125   1130   1135
Ile Lys Ala His Ser Asp Ile Val Leu Glu Ala Gly Gln Asn Asp Ala
            1140   1145   1150
Tyr Thr Phe Leu Lys Thr Lys Gly Lys Ser Gly Lys Ile Ile Arg Lys
            1155   1160   1165
Thr Lys Phe Thr Ser Thr Arg Asp His Leu Ile Met Pro Ala Pro Val
      1170   1175   1180
Glu Leu Thr Ala Asn Gly Ile Thr Leu Gln Ala Gly Gly Asn Ile Glu
1185   1190   1195   1200

3

```
Ala Asn Thr Thr Arg Phe Asn Ala Pro Ala Gly Lys Val Thr Leu Val
            1205                1210                1215
Ala Gly Glu Glu Leu Gln Leu Leu Ala Glu Glu Gly Ile His Lys His
            1220                1225                1230
Glu Leu Asp Val Gln Lys Ser Arg Arg Phe Ile Gly Ile Lys Val Gly
        1235                1240                1245
Lys Ser Asn Tyr Ser Lys Asn Glu Leu Asn Glu Thr Lys Leu Pro Val
    1250                1255                1260
Arg Val Val Ala Gln Thr Ala Ala Thr Arg Ser Gly Trp Asp Thr Val
1265                1270                1275                1280
Leu Glu Gly Thr Glu Phe Lys Thr Thr Leu Ala Gly Ala Asp Ile Gln
            1285                1290                1295
Ala Gly Val Gly Glu Lys Ala Arg Val Asp Ala Lys Ile Ile Leu Lys
            1300                1305                1310
Gly Ile Val Asn Arg Ile Gln Ser Glu Glu Lys Leu Glu Thr Asn Ser
            1315                1320                1325
Thr Val Trp Gln Lys Gln Ala Gly Arg Gly Ser Thr Ile Glu Thr Leu
    1330                1335                1340
Lys Leu Pro Ser Phe Glu Ser Pro Thr Pro Pro Lys Leu Ser Ala Pro
1345                1350                1355                1360
Gly Gly Tyr Ile Val Asp Ile Pro Lys Gly Asn Leu Lys Thr Glu Ile
            1365                1370                1375
Glu Lys Leu Ser Lys Gln Pro Glu Tyr Ala Tyr Leu Lys Gln Leu Gln
            1380                1385                1390
Val Ala Lys Asn Ile Asn Trp Asn Gln Val Gln Leu Ala Tyr Asp Arg
            1395                1400                1405
Trp Asp Tyr Lys Gln Glu Gly Leu Thr Glu Ala Gly Ala Ala Ile Ile
    1410                1415                1420
Ala Leu Ala Val Thr Val Val Thr Ser Gly Ala Gly Thr Gly Ala Val
1425                1430                1435                1440
Leu Gly Leu Asn Gly Ala Ala Ala Ala Ala Thr Asp Ala Ala Phe Ala
            1445                1450                1455
Ser Leu Ala Ser Gln Ala Ser Val Ser Phe Ile Asn Asn Lys Gly Asp
        1460                1465                1470
Val Gly Lys Thr Leu Lys Glu Leu Gly Arg Ser Ser Thr Val Lys Asn
    1475                1480                1485
Leu Val Val Ala Ala Ala Thr Ala Gly Val Ala Asp Lys Ile Gly Ala
    1490                1495                1500
Ser Ala Leu Asn Asn Val Ser Asp Lys Gln Trp Ile Asn Asn Leu Thr
1505                1510                1515                1520
Val Asn Leu Ala Asn Ala Gly Ser Ala Ala Leu Ile Asn Thr Ala Ile
            1525                1530                1535
Asn Gly Gly Ser Leu Lys Asp Asn Leu Gly Asp Ala Ala Leu Gly Ala
            1540                1545                1550
Ile Val Ser Thr Val His Gly Glu Val Ala Ser Lys Ile Lys Phe Asn
    1555                1560                1565
Leu Ser Glu Asp Tyr Ile Thr His Lys Ile Ala His Ala Ile Ala Gly
    1570                1575                1580
Cys Ala Ala Ala Ala Ala Asn Lys Gly Lys Cys Gln Asp Gly Ala Ile
1585                1590                1595                1600
Gly Ala Ala Val Gly Glu Ile Val Gly Glu Ala Leu Thr Asn Gly Lys
            1605                1610                1615
Asn Pro Ala Thr Leu Thr Ala Lys Glu Arg Glu Gln Ile Leu Ala Tyr
            1620                1625                1630
Ser Lys Leu Val Ala Gly Thr Val Ser Gly Val Val Gly Gly Asp Val
        1635                1640                1645
Asn Thr Ala Ala Asn Ala Ala Lys Val Ala Ile Glu Asn Asn Leu Leu
    1650                1655                1660
Ser Gln Glu Glu Tyr Ala Leu Arg Glu Lys Leu Ile Lys Lys Ala Lys
1665                1670                1675                1680
Gly Lys Gly Leu Leu Ser Leu Asp Trp Gly Ser Leu Thr Glu Gln Glu
            1685                1690                1695
```

4

Ala Arg Gln Phe Ile Tyr Leu Ile Glu Lys Asp Arg Tyr Ser Asn Gln
              1700   1705   1710
Leu Leu Asp Arg Tyr Gln Lys Asn Pro Ser Ser Leu Asn Asn Gln Glu
              1715   1720   1725
Lys Asn Ile Leu Ala Tyr Phe Ile Asn Gln Thr Ser Gly Gly Asn Thr
          1730   1735   1740
Ala Trp Ala Ala Ser Ile Leu Lys Thr Pro Gln Ser Met Gly Asn Leu
1745   1750   1755   1760
Thr Ile Pro Ser Lys Asp Ile Asn Asn Thr Leu Ser Lys Ala Tyr Gln
              1765   1770   1775
Thr Leu Ser Arg Tyr Asp Ser Phe Asp Tyr Lys Ser Ala Val Ala Ala
              1780   1785   1790
Gln Pro Ala Leu Tyr Leu Leu Asn Gly Pro Leu Gly Phe Ser Val Lys
              1795   1800   1805
Ala Ala Thr Val Ala Ala Gly Gly Tyr Asn Ile Gly Gln Gly Ala Lys
          1810   1815   1820
Ala Ile Ser Asn Gly Glu Tyr Leu His Gly Thr Val Gln Val Val Asn
1825   1830   1835   1840
Gly Thr Leu Met Val Ala Gly Ser Val Ser Ala Gln Ala Ala Ile Ser
              1845   1850   1855
Ala Lys Pro Ala Pro Val Thr Arg Tyr Leu Ser Asn Asp Ser Ala Pro
              1860   1865   1870
Ala Leu Arg Gln Ala Leu Thr Ala Glu Ser Gln Arg Ile Arg Met Lys
              1875   1880   1885
Leu Pro Glu Glu Tyr Arg Gln Ile Gly Asn Leu Ala Ile Ala Lys Ile
          1890   1895   1900
Asp Val Lys Gly Leu Pro Gln Arg Met Glu Ala Phe Ser Ser Phe Gln
1905   1910   1915   1920
Lys Gly Glu His Gly Phe Ile Ser Leu Pro Glu Thr Lys Ile Phe Lys
              1925   1930   1935
Pro Ile Ser Val Asp Lys Tyr His Asn Ile Ala Ser Pro Pro Arg Gly
          1940   1945   1950
Thr Leu Arg Asn Ile Asp Gly Glu Tyr Lys Leu Leu Glu Thr Ile Ala
          1955   1960   1965
Gln Gln Leu Gly Asn Asn Arg Asn Val Ser Gly Arg Ile Asp Leu Phe
          1970   1975   1980
Thr Glu Leu Lys Ala Cys Gln Ser Cys Ser Asn Val Ile Leu Glu Phe
1985   1990   1995   2000
Arg Asn Arg Tyr Pro Asn Ile Gln Leu Asn Ile Phe Thr Gly Lys
              2005   2010   2015

<210> 2
<211> 764
<212> PRT
<213> Neisseria gonorrhoeae

<400> 2
Met Arg Arg Glu Ala Lys Met Ala Gln Thr Thr Leu Lys Pro Ile Val
  1   5   10   15
Leu Ser Ile Leu Leu Ile Asn Thr Pro Leu Leu Ser Gln Ala His Gly
              20   25   30
Thr Glu Gln Ser Val Gly Leu Glu Thr Val Ser Val Val Gly Lys Ser
          35   40   45
Arg Pro Arg Ala Thr Ser Gly Leu Leu His Thr Ser Thr Ala Ser Asp
      50   55   60
Lys Ile Ile Ser Gly Asp Thr Leu Arg Gln Lys Ala Val Asn Leu Gly
65   70   75   80
Asp Ala Leu Asp Gly Val Pro Gly Ile His Ala Ser Gln Tyr Gly Gly
              85   90   95
Gly Ala Ser Ala Pro Val Ile Arg Gly Gln Thr Gly Arg Arg Ile Lys
              100   105   110

5

```
Val Leu Asn His His Gly Glu Thr Gly Asp Met Ala Asp Phe Ser Pro
        115                 120                 125
Asp His Ala Ile Met Val Asp Ser Ala Leu Ser Gln Gln Val Glu Ile
        130                 135                 140
Leu Arg Gly Pro Val Thr Leu Leu Tyr Ser Ser Gly Asn Val Ala Gly
145                 150                 155                 160
Leu Val Asp Val Ala Asp Gly Lys Ile Pro Glu Lys Met Pro Glu Asn
                165                 170                 175
Gly Val Ser Gly Glu Leu Gly Leu Arg Leu Ser Ser Gly Asn Leu Glu
                180                 185                 190
Lys Leu Thr Ser Gly Gly Ile Asn Ile Gly Leu Gly Lys Asn Phe Val
        195                 200                 205
Leu His Thr Glu Gly Leu Tyr Arg Lys Ser Gly Asp Tyr Ala Val Pro
        210                 215                 220
Arg Tyr Arg Asn Leu Lys Arg Leu Pro Asp Ser His Ala Asp Ser Gln
225                 230                 235                 240
Thr Gly Ser Ile Gly Leu Ser Trp Val Gly Glu Lys Gly Phe Ile Gly
                245                 250                 255
Ala Ala Tyr Ser Asp Arg Arg Asp Gln Tyr Gly Leu Pro Ala His Ser
                260                 265                 270
His Glu Tyr Asp Asp Cys His Ala Asp Ile Ile Trp Gln Lys Ser Leu
        275                 280                 285
Ile Asn Lys Arg Tyr Leu Gln Leu Tyr Pro His Leu Leu Thr Glu Glu
        290                 295                 300
Asp Ile Asp Tyr Asp Asn Pro Gly Leu Ser Cys Gly Phe His Asp Asp
305                 310                 315                 320
Asp Asp Ala His Ala His Ala His Asn Gly Lys Pro Trp Ile Asp Leu
                325                 330                 335
Arg Asn Lys Arg Tyr Glu Leu Arg Ala Glu Trp Lys Gln Pro Phe Pro
                340                 345                 350
Gly Phe Glu Ala Leu Arg Val His Leu Asn Arg Asn Asp Tyr Arg His
        355                 360                 365
Asp Glu Lys Ala Gly Asp Ala Val Glu Asn Phe Phe Asn Asn Gln Thr
        370                 375                 380
Gln Asn Ala Arg Ile Glu Leu Arg His Gln Pro Ile Gly Arg Leu Lys
385                 390                 395                 400
Gly Ser Trp Gly Val Gln Tyr Leu Gly Gln Lys Ser Ser Ala Leu Ser
                405                 410                 415
Ala Thr Ser Glu Ala Val Lys Gln Pro Met Leu Leu Asp Asn Lys Val
                420                 425                 430
Gln His Tyr Ser Phe Phe Gly Val Glu Gln Ala Asn Trp Asp Asn Phe
        435                 440                 445
Thr Leu Glu Gly Gly Val Arg Val Glu Lys Gln Lys Ala Ser Ile Arg
        450                 455                 460
Tyr Asp Lys Ala Leu Ile Asp Arg Glu Asn Tyr Tyr Asn His Pro Leu
465                 470                 475                 480
Pro Asp Leu Gly Ala His Arg Gln Thr Ala Arg Ser Phe Ala Leu Ser
                485                 490                 495
Gly Asn Trp Tyr Phe Thr Pro Gln His Lys Leu Ser Leu Thr Ala Ser
                500                 505                 510
His Gln Glu Arg Leu Pro Ser Thr Gln Glu Leu Tyr Ala His Gly Lys
        515                 520                 525
His Val Ala Thr Asn Thr Phe Glu Val Gly Asn Lys His Leu Asn Lys
        530                 535                 540
Glu Arg Ser Asn Asn Ile Glu Leu Ala Leu Gly Tyr Glu Gly Asp Arg
545                 550                 555                 560
Trp Gln Tyr Asn Leu Ala Leu Tyr Arg Asn Arg Phe Gly Asn Tyr Ile
                565                 570                 575
Tyr Ala Gln Thr Leu Asn Asp Gly Arg Gly Pro Lys Ser Ile Glu Asp
                580                 585                 590
Asp Ser Glu Met Lys Leu Val Arg Tyr Asn Gln Ser Gly Ala Asp Phe
        595                 600                 605
```

6

```
Tyr Gly Ala Glu Gly Glu Ile Tyr Phe Lys Pro Thr Pro Arg Tyr Arg
    610             615             620
Ile Gly Val Ser Gly Asp Tyr Val Arg Gly Arg Leu Lys Asn Leu Pro
625             630             635             640
Ser Leu Pro Gly Arg Glu Asp Ala Tyr Gly Asn Arg Pro Leu Ile Ala
            645             650             655
Gln Ala Asp Gln Asn Ala Pro Arg Val Pro Ala Ala Arg Leu Gly Val
            660             665             670
His Leu Lys Ala Ser Leu Thr Asp Arg Ile Asp Ala Asn Leu Asp Tyr
    675             680             685
Tyr Arg Val Phe Ala Gln Asn Lys Leu Ala Arg Tyr Glu Thr Arg Thr
    690             695             700
Pro Gly His His Met Leu Asn Leu Gly Ala Asn Tyr Arg Arg Asn Thr
705             710             715             720
Arg Tyr Gly Glu Trp Asn Trp Tyr Val Lys Ala Asp Asn Leu Leu Asn
            725             730             735
Gln Ser Val Tyr Ala His Ser Ser Phe Leu Ser Asp Thr Pro Gln Met
            740             745             750
Gly Arg Ser Phe Thr Gly Gly Val Asn Val Lys Phe
            755             760


<210> 3
<211> 720
<212> PRT
<213> Neisseria gonorrhoeae

<400> 3
Met Asn Thr Pro Leu Phe Arg Leu Ser Leu Leu Ser Leu Thr Leu Ala
  1           5               10              15
Ala Gly Phe Ala His Ala Ala Glu Asn Asn Ala Lys Val Val Leu Asp
            20              25              30
Thr Val Thr Val Lys Gly Asp Arg Gln Gly Ser Lys Ile Arg Thr Asn
        35              40              45
Ile Val Thr Leu Gln Gln Lys Asp Glu Ser Thr Ala Thr Asp Met Arg
    50              55              60
Glu Leu Leu Lys Glu Glu Pro Ser Ile Asp Phe Gly Gly Gly Asn Gly
65              70              75              80
Thr Ser Gln Phe Leu Thr Leu Arg Gly Met Gly Gln Asn Ser Val Asp
            85              90              95
Ile Lys Val Asp Asn Ala Tyr Ser Asp Ser Gln Ile Leu Tyr His Gln
            100             105             110
Gly Arg Phe Ile Val Asp Pro Ala Leu Val Lys Val Val Ser Val Gln
    115             120             125
Lys Gly Ala Gly Ser Ala Ser Ala Gly Ile Gly Ala Thr Asn Gly Ala
    130             135             140
Ile Ile Ala Lys Thr Val Asp Ala Gln Asp Leu Leu Lys Gly Leu Asp
145             150             155             160
Lys Asn Trp Gly Val Arg Leu Asn Ser Gly Phe Ala Ser Asn Glu Gly
            165             170             175
Val Ser Tyr Gly Ala Ser Val Phe Gly Lys Glu Gly Asn Phe Asp Gly
            180             185             190
Leu Phe Ser Tyr Asn Arg Asn Asp Glu Lys Asp Tyr Glu Ala Gly Lys
    195             200             205
Gly Phe Arg Asn Val Asn Gly Gly Lys Thr Val Pro Tyr Ser Ala Leu
    210             215             220
Asp Lys Arg Ser Tyr Leu Ala Lys Ile Gly Thr Thr Phe Gly Asp Asp
225             230             235             240
Asp His Arg Ile Val Leu Ser His Met Lys Asp Gln His Arg Gly Ile
            245             250             255
Arg Thr Val Arg Glu Glu Phe Thr Val Gly Asp Lys Ser Ser Arg Ile
            260             265             270
```

7

```
Asn Ile Asp Arg Gln Ala Pro Ala Tyr Arg Glu Thr Thr Gln Ser Asn
        275                 280                 285
Thr Asn Leu Ala Tyr Thr Gly Lys Asn Leu Gly Phe Val Glu Lys Leu
        290                 295                 300
Asp Ala Asn Ala Tyr Val Leu Glu Lys Glu Arg Tyr Ser Ala Asp Asp
305                 310                 315                 320
Ser Gly Thr Gly Tyr Ala Gly Asn Val Lys Gly Pro Asn His Thr Arg
                325                 330                 335
Ile Thr Thr Arg Gly Ala Asn Phe Asn Phe Asp Ser Arg Leu Ala Glu
        340                 345                 350
Gln Thr Leu Leu Lys Tyr Gly Ile Asn Tyr Arg His Gln Glu Ile Lys
        355                 360                 365
Pro Gln Ala Phe Leu Asn Ser Lys Phe Ser Ile Pro Thr Thr Glu Glu
        370                 375                 380
Lys Asn Gly Gln Lys Val Asp Lys Pro Met Glu Gln Gln Met Lys Asp
385                 390                 395                 400
Arg Ala Asp Glu Asp Thr Val His Ala Tyr Lys Leu Ser Asn Pro Thr
                405                 410                 415
Lys Thr Asp Thr Gly Val Tyr Val Glu Ala Ile His Asp Ile Gly Asp
                420                 425                 430
Phe Thr Leu Thr Gly Gly Leu Arg Tyr Asp Arg Phe Lys Val Lys Thr
        435                 440                 445
His Asp Gly Lys Thr Val Ser Ser Ser Asn Leu Asn Pro Ser Phe Gly
        450                 455                 460
Val Ile Trp Gln Pro His Glu His Trp Ser Phe Ser Ala Ser His Asn
465                 470                 475                 480
Tyr Ala Ser Arg Ser Pro Arg Leu Tyr Asp Ala Leu Gln Thr His Gly
                485                 490                 495
Lys Arg Gly Ile Ile Ser Ile Ala Asp Gly Thr Lys Ala Glu Arg Ala
                500                 505                 510
Arg Asn Thr Glu Ile Gly Phe Asn Tyr Asn Asp Gly Thr Phe Ala Ala
        515                 520                 525
Asn Gly Ser Tyr Phe Trp Gln Thr Ile Lys Asp Ala Leu Ala Asn Pro
        530                 535                 540
Gln Asn Arg His Asp Ser Val Ala Val Arg Glu Ala Val Asn Ala Gly
545                 550                 555                 560
Tyr Ile Lys Asn His Gly Tyr Glu Leu Gly Ala Ser Tyr Arg Thr Gly
                565                 570                 575
Gly Leu Thr Ala Lys Val Gly Val Ser His Ser Lys Pro Arg Phe Tyr
        580                 585                 590
Asp Thr His Lys Asp Lys Leu Leu Ser Ala Asn Pro Glu Phe Gly Ala
        595                 600                 605
Gln Val Gly Arg Thr Trp Thr Ala Ser Leu Ala Tyr Arg Phe Gln Asn
        610                 615                 620
Pro Asn Leu Glu Ile Gly Trp Arg Gly Arg Tyr Val Gln Lys Ala Thr
625                 630                 635                 640
Gly Ser Ile Leu Ala Ala Gly Gln Lys Asp Arg Lys Gly Asn Leu Glu
                645                 650                 655
Asn Val Val Arg Lys Gly Phe Gly Val Asn Asp Val Phe Ala Asn Trp
        660                 665                 670
Lys Pro Leu Gly Lys Asp Thr Leu Asn Val Asn Leu Ser Val Asn Asn
        675                 680                 685
Val Phe Asn Lys Phe Tyr Tyr Pro His Ser Gln Arg Trp Thr Asn Thr
        690                 695                 700
Leu Pro Gly Val Gly Arg Asp Val Arg Leu Gly Val Asn Tyr Lys Phe
705                 710                 715                 720
```

<210> 4
<211> 525
<212> PRT
<213> Neisseria gonorrhoeae

<400> 4

```
Met Arg Ala Asn Pro Lys Thr Gln Ala Met Pro Ser Glu Thr Ile Ser
1               5                   10                  15
Leu Met Lys Thr Arg Ser Leu Ile Ser Leu Leu Cys Leu Leu Leu Cys
            20                  25                  30
Ser Cys Ser Ser Trp Leu Pro Pro Leu Glu Glu Arg Thr Glu Ser Arg
        35                  40                  45
His Phe Asn Thr Ser Lys Pro Val Arg Leu Asp Asn Ile Leu Gln Ile
    50                  55                  60
Arg His Thr Pro His Thr Asn Gly Leu Ser Asp Ile Tyr Leu Leu Asn
65                  70                  75                  80
Asp Pro His Glu Ala Phe Ala Ala Arg Ala Ala Leu Ile Glu Ser Ala
            85                  90                  95
Glu His Ser Leu Asp Leu Gln Tyr Tyr Ile Trp Arg Asn Asp Ile Ser
            100                 105                 110
Gly Arg Leu Leu Phe Asn Leu Val Tyr Leu Ala Ala Glu Arg Gly Val
            115                 120                 125
Arg Val Arg Leu Leu Leu Asp Asp Asn Asn Thr Arg Gly Leu Asp Asp
    130                 135                 140
Leu Leu Leu Ala Leu Asp Ser His Pro Asn Ile Glu Val Arg Leu Phe
145                 150                 155                 160
Asn Pro Phe Val Leu Arg Lys Trp Arg Ala Leu Gly Tyr Leu Thr Asp
                165                 170                 175
Phe Pro Arg Leu Asn Arg Arg Met His Asn Lys Ser Phe Thr Ala Asp
            180                 185                 190
Asn Arg Ala Thr Ile Leu Gly Gly Arg Asn Ile Gly Asp Glu Tyr Phe
            195                 200                 205
Lys Val Gly Glu Asp Thr Val Phe Ala Asp Leu Asp Ile Leu Ala Thr
    210                 215                 220
Gly Ser Val Val Gly Glu Val Ser His Asp Phe Asp Arg Tyr Trp Ala
225                 230                 235                 240
Ser His Ser Ala His Asn Ala Thr Arg Ile Ile Arg Ser Gly Asn Ile
            245                 250                 255
Gly Lys Gly Leu Gln Ala Leu Gly Tyr Asn Asp Glu Thr Ser Arg His
            260                 265                 270
Ala Leu Leu Arg Tyr Arg Glu Thr Val Glu Gln Ser Pro Leu Tyr Gln
            275                 280                 285
Lys Ile Gln Thr Gly Arg Ile Asp Trp Gln Ser Val Gln Thr Arg Leu
    290                 295                 300
Ile Ser Asp Asp Pro Ala Lys Gly Leu Asp Arg Asp Arg Arg Lys Pro
305                 310                 315                 320
Pro Ile Ala Gly Arg Leu Gln Asp Ala Leu Lys Gln Pro Glu Lys Ser
                325                 330                 335
Val Tyr Leu Val Ser Pro Tyr Phe Val Pro Thr Lys Ser Gly Thr Asp
            340                 345                 350
Ala Leu Ala Lys Leu Val Gln Asp Gly Ile Asp Val Thr Val Leu Thr
            355                 360                 365
Asn Ser Leu Gln Ala Thr Asp Val Ala Ala Val His Ser Gly Tyr Val
    370                 375                 380
Lys Tyr Arg Lys Pro Leu Leu Lys Ala Gly Ile Lys Leu Tyr Glu Leu
385                 390                 395                 400
Gln Pro Asn His Ala Val Pro Ala Thr Lys Asp Lys Gly Leu Thr Gly
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Ser Ser Val Thr Ser Leu His Ala Lys Thr Phe Ile Val Asp Gly Lys
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Arg Ile Phe Ile Gly Ser Phe Asn Leu Asp Pro Arg Ser Ala Arg Leu
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Met Glu Arg Thr Leu Ala Asp Thr Ser Pro Glu Tyr Ala Tyr Arg Val
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9

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<213> Neisseria gonorrhoeae

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Leu Ser Leu Glu Lys Ile Gly Leu Leu Ser Leu Asp Met Asn Leu Gln
65                70                75              80
Glu Phe Ser Leu Leu Asn His Asn Leu Ile Leu Asp Ala Ile Lys Lys
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Val Ser Ser Ala Lys Thr Ser Trp Thr Glu Gly Thr Lys Gln Val Arg
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Val Leu Ser Leu Glu Ile Ser Gln Ile Cys Phe Gln Gln Ala Thr Ile
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11

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12

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<213> Neisseria gonorrhoeae

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caaacccgcc tcatcagcga cgacctgca aaaggactcg accgcgaccg ccgcaaaccg       960
ccgattgccg ggcggctgca agacgcgctc aaacagcccg aaaaaagcgt ctatctggtt      1020
tcaccctatt tcgtccccac aaaatccggc acagacgcac tggcaaaact ggtgcaggac      1080
ggcatagacg ttaccgtcct gaccaactcg ctacaggcga ccgacgttgc cgccgtccat      1140
tccggctatg tcaaataccg aaaaccgctg ctcaaagccg gcatcaaact ctacgagctg      1200
caacccaacc atgccgtccc tgccacaaaa gacaaaggcc tgaccggcag ctccgtaacc      1260
agcctgcatg ccaaaacctt cattgtggac ggcaaacgca tcttcatcgg ctcattcaac      1320
ctcgacccc gttccgcacg gctcaatact gaaatgggcg ttgttatcga aagccccaaa      1380
atcgcagaac agatggagcg caccccttgcc gatacctcac ccgaatacgc ctaccgcgtt      1440
accctcgaca ggcacaaccg cctgcaatgg cacgatcccg ccacccgaaa aacctacccg      1500
aacgaacccg aagccaaact ttggaaacgc atcgccgcaa aaatcctatc cctgctgccc      1560
atagaaagtt tattatag                                                    1578


<210> 10
<211> 993
<212> DNA
<213> Neisseria gonorrhoeae

<400> 10
atgggtaaag ggattttatc tttgcagcaa gaaatgtcgt tagaatatag tgaaaagtct        60
tatcaggaag ttttaaaaat cgccaagaa tcctattgga aacgcatgaa aagcttctcc       120
ttattcgaag ttattatgca ttggaccgca tcactcaaca aacatacttg tagatcatat       180
cgaggatctt ttttgtcttt agaaaagatt ggtctattgt ccttggatat gaatctgcaa       240
gagttttccc ttttaaatca taatctaatc ctagatgcga ttaaaaaagt ttcctctgcc       300
aagacttctt ggaccgaagg tactaaacaa gttcgagcag caagctatat ttccttaaca       360
agattcctaa acaggatgac tcaaggaata gtcgctatag cgcaaccttc taaacaagaa       420
aatagtcgaa catttttta aaccagggaa atagtaaaaa cggatgcgat gaacagtttg       480
caaacagcat ccttcctaaa agagctaaaa aaaatcaatg cccgggattg gttgatcgcc       540
cagacaatgc tccaaggagg taaacgctcc tctgaagtct taagcttgga gattagtcag       600
atttgtttcc aacaagctac catttctttc tcccagctta agaaccgtca gacagaaaag       660
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aggattatta taacttatcc tcagaagttt atgcacttttc tacaagagta catcggtcaa      720
cgaagaggtt ttgtcttcgt aactcgctcc ggaaaaatgg tggggttaag gcaaatcgcc      780
cgcacgttct ctcaagcagg actacaagct gcaatccctt ttaaaataac cccgcacgtg      840
cttcgagcaa ccgctgtgac ggagtacaaa cgcctagggt gctcagactc cgacataatg      900
aaggtcacag gacacgcaac cgcaaagatg atatttgcgt acgataaatc ttctcgagaa      960
gacaacgctt caaagaagat ggctctaata tag                                   993
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<210> 11
<211> 199
<212> PRT
<213> Mus musculus

<400> 11
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Phe Pro Gln Gln Glu Ser Asp Ile Val Phe Leu Ile Asp Gly Ser Gly
 1               5                  10                  15
Ser Ile Asn Asn Ile Asp Phe Gln Lys Met Lys Glu Phe Val Ser Thr
            20                  25                  30
Val Met Glu Gln Phe Lys Lys Ser Lys Thr Leu Phe Ser Leu Met Gln
        35                  40                  45
Tyr Ser Asp Glu Phe Arg Ile His Phe Thr Phe Asn Asp Phe Lys Arg
    50                  55                  60
Asn Pro Ser Pro Arg Ser His Val Ser Pro Ile Lys Gln Leu Asn Gly
65                  70                  75                  80
Arg Thr Lys Thr Ala Ser Gly Ile Arg Lys Val Val Arg Glu Leu Phe
            85                  90                  95
His Lys Thr Asn Gly Ala Arg Glu Asn Ala Ala Lys Ile Leu Val Val
            100                 105                 110
Ile Thr Asp Gly Glu Lys Phe Gly Asp Pro Leu Asp Tyr Lys Asp Val
        115                 120                 125
Ile Pro Glu Ala Asp Arg Ala Gly Val Ile Arg Tyr Val Ile Gly Val
    130                 135                 140
Gly Asn Ala Phe Asn Lys Pro Gln Ser Arg Arg Glu Leu Asp Thr Ile
145                 150                 155                 160
Ala Ser Lys Pro Ala Gly Glu His Val Phe Gln Val Asp Asn Phe Glu
            165                 170                 175
Ala Leu Asn Thr Ile Gln Asn Gln Leu Gln Glu Lys Ile Phe Ala Ile
            180                 185                 190
Pro Ala Ala Ala Ser Phe Leu
        195
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<210> 12
<211> 597
<212> DNA
<213> Mus musculus

<400> 12
```
ttccctcagc aggagagtga cattgtcttc ttgattgatg gctccggtag catcaacaac       60
attgactttc agaagatgaa ggagtttgtc tcaactgtga tggagcagtt caaaaagtct      120
aaaaccttgt tctctttgat gcagtactcg gacgagttcc ggattcactt caccttcaat      180
gacttcaaga gaaaccctag cccaagatca catgtgagcc cccataaagca gctgaatggg      240
aggacaaaaa ctgcctcagg gatccggaaa gtagtgagag aactgtttca caaaaccaat      300
ggggcccggg agaatgctgc gaagatccta gttgtcatca cagatggaga aaaattcggt      360
gatcccttgg attataagga tgtcatcccc gaggcagaca gagcaggggt cattcgctac      420
gtaattgggg tgggaaatgc cttcaacaaa ccacagtccc gcagagagct cgacaccatc      480
gcatctaagc cagctggtga acacgtgttc caagtggaca ctttgaagc cctgaatacc      540
attcagaacc agcttcagga aaagatcttt gcaattcccg cggccgccag ctttcta        597
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<210> 13
<211> 1561
<212> DNA
<213> Neisseria gonorrhoeae 1291

15

<400> 13
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caaaatacag gcaatgccgt ctgaaactat atccccgatg aaaacacgca gcctcatttc    60
ccttttatgc ctccttctct gttcatgttc ttcatggttg cccccactgg aagaacggac   120
ggaaagccgt catttcaata cttccaaacc tgtcctcctg acaacatcc tgcaaatccg     180
gcacacccct cataacaacg ggctatccga catctacctg ctcgacgacc cccacgaagc    240
ccttgccgcc cgcgccgccc ttatcgaatc tgccgaacac agcctcgatt tgcaatacta    300
catttggcgc aacgacattt ccggcaggct gctgttcaac ctcatgtacc ttgccgcaga    360
acgcggcgtg cgcgtacgcc tgctgttgga cgacaacaac acgcgcgggt tggacgatct    420
cctgctcgcc ctcgacagcc atcccaatat cgaagtgcgc ctgttcaacc ccttcgtcct    480
acgcaaatgg cgcgcactcg gctacctgac cgacttcccc cgcctcaacc gccgcatgca    540
caacaaatcc tttaccgccg acaaccgcgc caccatactc ggcggacgca atatcggcga    600
cgaatacttc aaagtcggtg aggacaccgt tttcgccgac ctggacatcc tcgccaccgg    660
cagcgtcgtc ggcgaagtat cgcacgactt cgaccgctac tgggcaagcc attccgccca    720
caacgccacg cgcatcatcc gcagcggcaa catcggcaag ggtcttcaag cactcggata    780
caacgacgaa acatccagac acgcgctcct gcgctaccgc gaaaccgtcg aacagtcgcc    840
cctctaccaa aaaatacaga cgggacgcat cgactggcag agcgtccaaa cccgcctgat    900
cagcgacacc cctgcaaaag gactcgaccg cgaccgccgc aaaccgccga ttgccgggag    960
gctgcaagac gcgctcaaac agcccgaaaa aagcgtctat ctggtttcac cctatttcgt   1020
ccctacaaaa tccggcacag acgcactggc aaaactggtg caggacggca tagacgttac   1080
cgtcctgacc aactcgctac aggcgaccga cgttgccgcc gtccattccg gctacgtcaa   1140
ataccgaaaa ccgctgctca agccggcat caaactctac gagctgcaac caaccatgc    1200
cgtccccgcc acaaaagaca aaggcctgac cggcagctcc gtaaccagcc tgcatgccaa   1260
aaccttcatt gtggacggca aacgcatctt catcggctca ttcaacctcg accccgttc    1320
cgcacggctc aataccgaaa tgggcgtcgt catcgaaagc cccaaaatcg cagaacagat   1380
ggagcgcacc ctcgccgata ccacacccga atacgcctac cgcgttaccc tcgacaaaca   1440
caaccgcctg caatggcacg atcccgccac ccgaaaaacc tacccgaacg aacccgaagc   1500
caaactttgg aaacgcatcg ccgcaaaaat cctatccctg ctgcccatcg aaggtttatt   1560
a                                                                   1561
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<210> 14
<211> 525
<212> PRT
<213> Neisseria gonorrhoeae 1291

<400> 14
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Met His Thr Asp Pro Lys Ile Gln Ala Met Pro Ser Glu Thr Ile Ser
 1               5                  10                  15
Pro Met Lys Thr Arg Ser Leu Ile Ser Leu Leu Cys Leu Leu Leu Cys
            20                  25                  30
Ser Cys Ser Ser Trp Leu Pro Pro Leu Glu Glu Arg Thr Glu Ser Arg
            35                  40                  45
His Phe Asn Thr Ser Lys Pro Val Leu Leu Asp Asn Ile Leu Gln Ile
        50                  55                  60
Arg His Thr Pro His Asn Asn Gly Leu Ser Asp Ile Tyr Leu Leu Asp
65                  70                  75                  80
Asp Pro His Glu Ala Leu Ala Ala Arg Ala Ala Leu Ile Glu Ser Ala
                85                  90                  95
Glu His Ser Leu Asp Leu Gln Tyr Tyr Ile Trp Arg Asn Asp Ile Ser
            100                 105                 110
Gly Arg Leu Leu Phe Asn Leu Met Tyr Leu Ala Ala Glu Arg Gly Val
            115                 120                 125
Arg Val Arg Leu Leu Leu Asp Asp Asn Asn Thr Arg Gly Leu Asp Asp
        130                 135                 140
Leu Leu Leu Ala Leu Asp Ser His Pro Asn Ile Glu Val Arg Leu Phe
145                 150                 155                 160
Asn Pro Phe Val Leu Arg Lys Trp Arg Ala Leu Gly Tyr Leu Thr Asp
                165                 170                 175
Phe Pro Arg Leu Asn Arg Arg Met His Asn Lys Ser Phe Thr Ala Asp
            180                 185                 190
Asn Arg Ala Thr Ile Leu Gly Gly Arg Asn Ile Gly Asp Glu Tyr Phe
            195                 200                 205
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16

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Lys Val Gly Glu Asp Thr Val Phe Ala Asp Leu Asp Ile Leu Ala Thr
    210                 215                 220
Gly Ser Val Val Gly Glu Val Ser His Asp Phe Asp Arg Tyr Trp Ala
225                 230                 235                 240
Ser His Ser Ala His Asn Ala Thr Arg Ile Ile Arg Ser Gly Asn Ile
                245                 250                 255
Gly Lys Gly Leu Gln Ala Leu Gly Tyr Asn Asp Glu Thr Ser Arg His
                260                 265                 270
Ala Leu Leu Arg Tyr Arg Glu Thr Val Glu Gln Ser Pro Leu Tyr Gln
            275                 280                 285
Lys Ile Gln Thr Gly Arg Ile Asp Trp Gln Ser Val Gln Thr Arg Leu
        290                 295                 300
Ile Ser Asp Thr Pro Ala Lys Gly Leu Asp Arg Asp Arg Arg Lys Pro
305                 310                 315                 320
Pro Ile Ala Gly Arg Leu Gln Asp Ala Leu Lys Gln Pro Glu Lys Ser
                325                 330                 335
Val Tyr Leu Val Ser Pro Tyr Phe Val Pro Thr Lys Ser Gly Thr Asp
            340                 345                 350
Ala Leu Ala Lys Leu Val Gln Asp Gly Ile Asp Val Thr Val Leu Thr
            355                 360                 365
Asn Ser Leu Gln Ala Thr Asp Val Ala Ala Val His Ser Gly Tyr Val
    370                 375                 380
Lys Tyr Arg Lys Pro Leu Leu Lys Ala Gly Ile Lys Leu Tyr Glu Leu
385                 390                 395                 400
Gln Pro Asn His Ala Val Pro Ala Thr Lys Asp Lys Gly Leu Thr Gly
                405                 410                 415
Ser Ser Val Thr Ser Leu His Ala Lys Thr Phe Ile Val Asp Gly Lys
            420                 425                 430
Arg Ile Phe Ile Gly Ser Phe Asn Leu Asp Pro Arg Ser Ala Arg Leu
        435                 440                 445
Asn Thr Glu Met Gly Val Val Ile Glu Ser Pro Lys Ile Ala Glu Gln
    450                 455                 460
Met Glu Arg Thr Leu Ala Asp Thr Thr Pro Glu Tyr Ala Tyr Arg Val
465                 470                 475                 480
Thr Leu Asp Lys His Asn Arg Leu Gln Trp His Asp Pro Ala Thr Arg
                485                 490                 495
Lys Thr Tyr Pro Asn Glu Pro Glu Ala Lys Leu Trp Lys Arg Ile Ala
                500                 505                 510
Ala Lys Ile Leu Ser Leu Leu Pro Ile Glu Gly Leu Leu
        515                 520                 525


<210> 15
<211> 1563
<212> DNA
<213> Neisseria gonorrhoeae 1090

<400> 15
caaaatacag gcaatgccgt ctgaaactat atccccgatg aaaacacgca gcctcatttc      60
cctttttatgc ctccttctct gttcatgttc ttcatggttg cccccactgg aagaacggac    120
ggaaagccgt cattttaata cttccaaacc tgtcctcctg acaacatcc tgcaaatccg       180
gcacacccct cataacaacg ggctatccga catctacctg ctcgacgacc cccacgaagc      240
ctttgccgcc cgcgccgccc ttatcgaatc tgccgaacac agcctcgatt tgcaatacta      300
catttggcgc aacgacattt ccggcaggct gctgttcaac ctcatgtacc ttgccgcaga      360
acgcggcgtg cgcgtacgcc tgctgttgga cgacaacaac acgcgcggct ggacgatct       420
cctgctcgcc ctcgacagcc atcccaatat cgaagtgcgc ccgttcaacc ccttcgtcct      480
acgcaaatgg cgcgcactcg ctacctgac cgacttcccc cgcctcaacc gccgcatgca       540
caacaaatcc tttaccgccg caaccgcgc caccatactc ggcggacgca atatcggcga       600
cgaatacttc aaagtcggtg aggacaccgt tttcgccgac ctggacatcc tcgccaccgg      660
cagcgtcgtc ggcgaagtat cgcacgactt cgaccgctac tgggcaagcc attccgccca     720
caacgccacg cgcatcatcc gcagcggcaa catcggcaag ggtcttcaag cactcggata     780
caacgacgaa acatccagac acgcgctcct gcgctaccgg gaaaccgtag aacagtcgcc     840
cctctaccaa aaatacagac gggacgcatc gactggcaga gcgtccaaac ccgcttgatc     900
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17

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agcgacagcc ctgcaaaagg actcgagacc cgcgaccgcc gcaaaccgcg gattgccggg      960
aggctgcaag acgcgctcaa acagcccgaa aaaagcgtct atctggtttc accctatttc     1020
gtccctacaa aatccggcac agacgcactg gcaaaactgg tgcaggacgg catagacgtt     1080
accgtcctga ccaactcgct acaggcgacc gacgttgccg ccgtccattc cggctacgtc     1140
aaataccgaa aaccgctgct caaagccggc atcaaactct acgagctgca acccaaccat     1200
gccgtccccg ccacaaaaga caaaggcctg accggcagct ccgtaaccag cctgcatgcc     1260
aaaaccttca ttgtggacgg caaacgcatc ttcatcggct cattcaacct cgacccccgt     1320
tccgcacggc tcaataccga aatgggcgtc gtcatcgaaa gccccaaaat cgcagaacag     1380
atggagcgca ccctcgccga taccacaccc gaatacgcct accgcgttac cctcgacaaa     1440
cacaaccgcc tgcaatggca cgatcccgcc acccgaaaaa cctacccgaa cgaacccgaa     1500
gccaaacttt ggaaacgcat cgccgcaaaa atcctatccc tgctgcccat cgaaggttta     1560
tta                                                                    1563


<210> 16
<211> 525
<212> PRT
<213> Neisseria gonorrhoeae 1090

<400> 16
Met His Thr Asp Pro Lys Ile Gln Ala Met Pro Ser Glu Thr Ile Ser
1               5                   10                  15
Pro Met Lys Thr Arg Ser Leu Ile Ser Leu Leu Cys Leu Leu Leu Cys
            20                  25                  30
Ser Cys Ser Ser Trp Leu Pro Pro Leu Glu Glu Arg Thr Glu Ser Arg
            35                  40                  45
His Phe Asn Thr Ser Lys Pro Val Leu Leu Asp Asn Ile Leu Gln Ile
    50                  55                  60
Arg His Thr Pro His Asn Asn Gly Leu Ser Asp Ile Tyr Leu Leu Asp
65                  70                  75                  80
Asp Pro His Glu Ala Phe Ala Ala Arg Ala Ala Leu Ile Glu Ser Ala
                85                  90                  95
Glu His Ser Leu Asp Leu Gln Tyr Tyr Ile Trp Arg Asn Asp Ile Ser
            100                 105                 110
Gly Arg Leu Leu Phe Asn Leu Met Tyr Leu Ala Ala Glu Arg Gly Val
            115                 120                 125
Arg Val Arg Leu Leu Leu Asp Asp Asn Asn Thr Arg Gly Leu Asp Asp
    130                 135                 140
Leu Leu Leu Ala Leu Asp Ser His Pro Asn Ile Glu Val Arg Leu Phe
145                 150                 155                 160
Asn Pro Phe Val Leu Arg Lys Trp Arg Ala Leu Gly Tyr Leu Thr Asp
                165                 170                 175
Phe Pro Arg Leu Asn Arg Arg Met His Asn Lys Ser Phe Thr Ala Asp
            180                 185                 190
Asn Arg Ala Thr Ile Leu Gly Gly Arg Asn Ile Gly Asp Glu Tyr Phe
            195                 200                 205
Lys Val Gly Glu Asp Thr Val Phe Ala Asp Leu Asp Ile Leu Ala Thr
    210                 215                 220
Gly Ser Val Val Gly Glu Val Ser His Asp Phe Asp Arg Tyr Trp Ala
225                 230                 235                 240
Ser His Ser Ala His Asn Ala Thr Arg Ile Ile Arg Ser Gly Asn Ile
                245                 250                 255
Gly Lys Gly Leu Gln Ala Leu Gly Tyr Asn Asp Glu Thr Ser Arg His
            260                 265                 270
Ala Leu Leu Arg Tyr Arg Glu Thr Val Glu Gln Ser Pro Leu Tyr Gln
            275                 280                 285
Lys Ile Gln Thr Gly Arg Ile Asp Trp Gln Ser Val Gln Thr Arg Leu
    290                 295                 300
Ile Ser Asp Ser Pro Ala Lys Gly Leu Asp Arg Asp Arg Arg Lys Pro
305                 310                 315                 320
Pro Ile Ala Gly Arg Leu Gln Asp Ala Leu Lys Gln Pro Glu Lys Ser
                325                 330                 335
```

18

Val Tyr Leu Val Ser Pro Tyr Phe Val Pro Thr Lys Ser Gly Thr Asp
        340   345   350
Ala Leu Ala Lys Leu Val Gln Asp Gly Ile Asp Val Thr Val Leu Thr
        355   360   365
Asn Ser Leu Gln Ala Thr Asp Val Ala Ala Val His Ser Gly Tyr Val
    370   375   380
Lys Tyr Arg Lys Pro Leu Leu Lys Ala Gly Ile Lys Leu Tyr Glu Leu
385   390   395   400
Gln Pro Asn His Ala Val Pro Ala Thr Lys Asp Lys Gly Leu Thr Gly
            405   410   415
Ser Ser Val Thr Ser Leu His Ala Lys Thr Phe Ile Val Asp Gly Lys
  ·   420   425   430
Arg Ile Phe Ile Gly Ser Phe Asn Leu Asp Pro Arg Ser Ala Arg Leu
        435   440   445
Asn Thr Glu Met Gly Val Val Ile Glu Ser Pro Lys Ile Ala Glu Gln
    450   455   460
Met Glu Arg Thr Leu Ala Asp Thr Thr Pro Glu Tyr Ala Tyr Arg Val
465   470   475   480
Thr Leu Asp Lys His Asn Arg Leu Gln Trp His Asp Pro Ala Thr Arg
            485   490   495
Lys Thr Tyr Pro Asn Glu Pro Glu Ala Lys Leu Trp Lys Arg Ile Ala
            500   505   510
Ala Lys Ile Leu Ser Leu Leu Pro Ile Glu Gly Leu Leu
            515   520   525

<210> 17
<211> 1564
<212> DNA
<213> Neisseria gonorrhoeae ms11

<400> 17
caaaatacag gcaatgccgt ctgaaactat atccccgatg aaaacacgca gcctcatttc   60
ccttttatgc ctccttctct gttcatgttc ttcatggttg cccccactgg aagaacggac   120
ggaaagccgt catttcaata cttccaaacc tgtcctcctg acaacatcc tgcaaatccg   180
gcacacccct cataacaacg ggctatccga catctacctg ctcgacgacc cccacgaagc   240
ctttgccgcc cgcgccgccc ttatcgaatc tgccgaacac agcctcgatt tgcaatacta   300
catttggcgc aacgacattt ccggcaggct gctgttcaac ctcatgtacc ttgccgcaga   360
acgcggcgtg cgcgtacgcc tgctgttgga cgacaacaac acgcgcgggt tggacgatct   420
cctgctcgcc ctcgacagcc atcccaatat cgaagtgcgc ctgttcaacc ccttcgtcct   480
acgcaaatgg cgcgcactcg gctacctgac cgacttcccc cgcctcaacc gccgcatgca   540
caacaaatcc tttaccgccg acaaccgcgc caccatactc ggcggacgca atatcggcga   600
cgaatacttc aaagtcggtg aggacaccgt tttcgccgac ctggacatcc tcgccaccgg   660
cagcgtcgtc cggcgaagta tcgcacgact tcgaccgcta ctgggcaagc cattccgccc   720
acaacgccac gcgcaattat tccgcagcgg caacatcggc aagggtcttc aagcactcgg   780
atacaacgac gaaacttcca gacccgcgct tctgcgctac cgggaaaccg tcgaacagtc   840
gcccttctac caaaaaatac agacgggacg catcgactgg cagagcgtcc aaacccgcct   900
gatcagcgac aaccctgcaa aaggactcga ccgcgaccgc cgcaaaccgc cgattgccgg   960
gaggctgcaa gacgcgctca aacagcccga aaaaagcgtc tatctggttt caccctattt   1020
cgtccctaca aaatccggca cagacgcact ggcaaaactg gtgcaggacg gcatagacgt   1080
taccgtcctg accaactcgc tacaggcgac cgacgttgcc gccgtccatt ccggctacgt   1140
caaataccga aaaccgctgc tcaaagccgg catcaaactc tacgagctgc aacccaacca   1200
tgccgtcccc gccacaaaag acaaaggcct gaccggcagc tccgtaacca gcctgcatgc   1260
caaaaccttc attgtggacg gcaaacgcat cttcatcggc tcattcaacc tcgaccccscg   1320
ttccgcacgg ctcaataccg aaatgggcgt cgtcatcgaa agccccaaaa tcgcagaaca   1380
gatggagcgc accctcgccg ataccacacc cgaatacgcc taccgcgtta ccctcgacaa   1440
acacaaccgc ctgcaatggc acgatcccgc cacccgaaaa acctacccga acgaacccga   1500
agccaaactt tggaaacgca tcgccgcaaa aatcctatcc ctgctgccca tcgaaggttt   1560
atta   1564

<210> 18
<211> 525
<212> PRT
<213> Neisseria gonorrhoeae ms11

<400> 18
Met His Thr Asp Pro Lys Ile Gln Ala Met Pro Ser Glu Thr Ile Ser
 1   5   10   15
Pro Met Lys Thr Arg Ser Leu Ile Ser Leu Leu Cys Leu Leu Leu Cys
            20   25   30
Ser Cys Ser Ser Trp Leu Pro Pro Leu Glu Glu Arg Thr Glu Ser Arg
         35   40   45
His Phe Asn Thr Ser Lys Pro Val Leu Leu Asp Asn Ile Leu Gln Ile
     50   55   60
Arg His Thr Pro His Asn Asn Gly Leu Ser Asp Ile Tyr Leu Leu Asp
65   70   75   80
Asp Pro His Glu Ala Phe Ala Ala Arg Ala Ala Leu Ile Glu Ser Ala
                85   90   95
Glu His Ser Leu Asp Leu Gln Tyr Tyr Ile Trp Arg Asn Asp Ile Ser
            100   105   110
Gly Arg Leu Leu Phe Asn Leu Met Tyr Leu Ala Ala Glu Arg Gly Val
            115   120   125
Arg Val Arg Leu Leu Leu Asp Asp Asn Asn Thr Arg Gly Leu Asp Asp
    130   135   140
Leu Leu Leu Ala Leu Asp Ser His Pro Asn Ile Glu Val Arg Leu Phe
145   150   155   160
Asn Pro Phe Val Leu Arg Lys Trp Arg Ala Leu Gly Tyr Leu Thr Asp
                165   170   175
Phe Pro Arg Leu Asn Arg Arg Met His Asn Lys Ser Phe Thr Ala Asp
            180   185   190
Asn Arg Ala Thr Ile Leu Gly Gly Arg Asn Ile Gly Asp Glu Tyr Phe
            195   200   205
Lys Val Gly Glu Asp Thr Val Phe Ala Asp Leu Asp Ile Leu Ala Thr
    210   215   220
Gly Ser Val Val Gly Glu Val Ser His Asp Phe Asp Arg Tyr Trp Ala
225   230   235   240
Ser His Ser Ala His Asn Ala Thr Arg Ile Ile Arg Ser Gly Asn Ile
                245   250   255
Gly Lys Gly Leu Gln Ala Leu Gly Tyr Asn Asp Glu Thr Ser Arg His
            260   265   270
Ala Leu Leu Arg Tyr Arg Glu Thr Val Glu Gln Ser Pro Phe Tyr Gln
            275   280   285
Lys Ile Gln Thr Gly Arg Ile Asp Trp Gln Ser Val Gln Thr Arg Leu
    290   295   300
Ile Ser Asp Ser Pro Ala Lys Gly Leu Asp Arg Asp Arg Arg Lys Pro
305   310   315   320
Pro Ile Ala Gly Arg Leu Gln Asp Ala Leu Lys Gln Pro Glu Lys Ser
                325   330   335
Val Tyr Leu Val Ser Pro Tyr Phe Val Pro Thr Lys Ser Gly Thr Asp
            340   345   350
Ala Leu Ala Lys Leu Val Gln Asp Gly Ile Asp Val Thr Val Leu Thr
            355   360   365
Asn Ser Leu Gln Ala Thr Asp Val Ala Ala Val His Ser Gly Tyr Val
    370   375   380
Lys Tyr Arg Lys Pro Leu Leu Lys Ala Gly Ile Lys Leu Tyr Glu Leu
385   390   395   400
Gln Pro Asn His Ala Val Pro Ala Thr Lys Asp Lys Gly Leu Thr Gly
                405   410   415
Ser Ser Val Thr Ser Leu His Ala Lys Thr Phe Ile Val Asp Gly Lys
            420   425   430
Arg Ile Phe Ile Gly Ser Phe Asn Leu Asp Pro Arg Ser Ala Arg Leu
            435   440   445

20

```
Asn Thr Glu Met Gly Val Val Ile Glu Ser Pro Lys Ile Ala Glu Gln
    450                     455                 460
Met Glu Arg Thr Leu Ala Asp Thr Thr Pro Glu Tyr Ala Tyr Arg Val
465                 470                 475                     480
Thr Leu Asp Lys His Asn Arg Leu Gln Trp His Asp Pro Ala Thr Arg
                485                 490                 495
Lys Thr Tyr Pro Asn Glu Pro Glu Ala Lys Leu Trp Lys Arg Ile Ala
            500                 505                 510
Ala Lys Ile Leu Ser Leu Leu Pro Ile Glu Gly Leu Leu
        515                 520                 525
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<210> 19
<211> 1564
<212> DNA
<213> Neisseria meningitidis B

<220>
<221> misc_feature
<222> (1)...(1564)
<223> n = a or t or g or c.

<400> 19
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ccttttatgc ctccttctct gttcatgttc ttcatggttg cccccactgg aagaacggac   120
ggaaagccgt catttcaata cttccaaacc cgtccgcctg acaacatcc tgcaaatccg    180
gcacacccct cataccaacg ggctatccga tatctatctg ttgaacgacc cccacgaagc   240
ctttgccgcc cgcgccgccc ttatcgaatc tgccgaacac agcctcgatt tgcaatacta   300
catctggcgc aacgacattt ccggccgact gctgttcaac ctcgtgtacc ttgccgcaga   360
acgcggtgtg cgcgtacgcc tgctgttgga cgacaacaac acgcgcggat tggacgacct   420
cctgctcgcc ctcgacagcc atcccaatat cgaagtgcgc ctgttcaacc ccttcgtctt   480
acgaaaatgg cgcgcactcg gctacctgac cgacttcccc cgcctcaacc gccgcatgca   540
caacaaatcc tttaccgccg acaaccgcgc caccatactc ggcggacgca atatcggcga   600
cgaatacttc aaagtcggtg aggacaccgt tttcgccgac ctggacatnc tcgccaccgg   660
cagcgtcgtt agcgaagtat cgcacgactt tgaccgctac tgggcaagcc attncgncca   720
caacgccacg cgcataatnc gcagcggnaa catcggnaag gggttttcaa gcactcggnt   780
acaacgacga aaacgtncag acacgngntc ntgcgctacc gggagaccgt cgaacagtcg   840
cccntctacc aaaaaataca ggcaggacgc atcgactggc agagcgtcca aacccgcctc   900
atcagcgacg acccntgcaa aaggactcga ccgcgaccgc cgcaaaccgc ngattgccgg   960
gcgnctgcaa gacgcgctca aacagccnga aaaaagcgtc tatctggttt caccctattt  1020
cgtccccaca aaatccggca cagacgcact ggcaaaactg gtgcaggacg catagacgt   1080
taccgttctg accaactcgc tacaggcgac cgacgttgcc gccgtccatt ctggctatgt  1140
caaataccga aaaccgttgc tcaaagccgg catcaaactc tacgagctgc aacccaacca  1200
tgccgtcccc gccacaaaag acaaaggcct gaccggcagc tccgtaacca gcctgcacgc  1260
caaaaccttc attgtggacg gcaaacgcat cttcatcggc tcattcaacc tcgacccccg  1320
ttccgcacgg ctcaataccg aaatgggtgt cgtcatcgaa agccccaaaa tcgcagaaca  1380
gatggagcgc acccttgccg ataccacacc cgaatacgcc taccgcgtta ccctcggcag  1440
gcacaaccgc ctgcaatggc acgatcccgc cacccgaaaa acctacccga acgaacccga  1500
agccaaactt tggaaacgca tcgccgcaaa aatcctatcc ctgctgccca tcgaaggttt  1560
atta                                                             1564
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<210> 20
<211> 525
<212> PRT
<213> Neisseria meningitidis B

<400> 20
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Met Arg Ala Asn Pro Lys Thr Gln Ala Met Pro Ser Glu Thr Ile Ser
1               5                   10                  15
Leu Met Lys Thr Arg Ser Leu Ile Ser Leu Leu Cys Leu Leu Leu Cys
            20                  25                  30
Ser Cys Ser Ser Trp Leu Pro Pro Leu Glu Glu Arg Thr Glu Ser Arg
        35                  40                  45
```

21

His Phe Asn Thr Ser Lys Pro Val Arg Leu Asp Asn Ile Leu Gln Ile
        50   55   60
Arg His Thr Pro His Thr Asn Gly Leu Ser Asp Ile Tyr Leu Leu Asn
65   70   75   80
Asp Pro His Glu Ala Phe Ala Ala Arg Ala Leu Ile Glu Ser Ala
                85   90   95
Glu His Ser Leu Asp Leu Gln Tyr Tyr Ile Trp Arg Asn Asp Ile Ser
            100   105   110
Gly Arg Leu Leu Phe Asn Leu Val Tyr Leu Ala Ala Glu Arg Gly Val
        115   120   125
Arg Val Arg Leu Leu Leu Asp Asp Asn Asn Thr Arg Gly Leu Asp Asp
    130   135   140
Leu Leu Leu Ala Leu Asp Ser His Pro Asn Ile Glu Val Arg Leu Phe
145   150   155   160
Asn Pro Phe Val Leu Arg Lys Trp Arg Ala Leu Gly Tyr Leu Thr Asp
                165   170   175
Phe Pro Arg Leu Asn Arg Arg Met His Asn Lys Ser Phe Thr Ala Asp
            180   185   190
Asn Arg Ala Thr Ile Leu Gly Gly Arg Asn Ile Gly Asp Glu Tyr Phe
        195   200   205
Lys Val Gly Glu Asp Thr Val Phe Ala Asp Leu Asp Ile Leu Ala Thr
    210   215   220
Gly Ser Val Val Gly Glu Val Ser His Asp Phe Asp Arg Tyr Trp Ala
225   230   235   240
Ser His Ser Ala His Asn Ala Thr Arg Ile Ile Arg Ser Gly Asn Ile
                245   250   255
Gly Lys Gly Leu Gln Ala Leu Gly Tyr Asn Asp Glu Thr Ser Arg His
        260   265   270
Ala Leu Leu Arg Tyr Arg Glu Thr Val Glu Gln Ser Pro Leu Tyr Gln
    275   280   285
Lys Ile Gln Thr Gly Arg Ile Asp Trp Gln Ser Val Gln Thr Arg Leu
    290   295   300
Ile Ser Asp Asp Pro Ala Lys Gly Leu Asp Arg Asp Arg Arg Lys Pro
305   310   315   320
Pro Ile Ala Gly Arg Leu Gln Asp Ala Leu Lys Gln Pro Glu Lys Ser
            325   330   335
Val Tyr Leu Val Ser Pro Tyr Phe Val Pro Thr Lys Ser Gly Thr Asp
        340   345   350
Ala Leu Ala Lys Leu Val Gln Asp Gly Ile Asp Val Thr Val Leu Thr
        355   360   365
Asn Ser Leu Gln Ala Thr Asp Val Ala Ala Val His Ser Gly Tyr Val
    370   375   380
Lys Tyr Arg Lys Pro Leu Leu Lys Ala Gly Ile Lys Leu Tyr Glu Leu
385   390   395   400
Gln Pro Asn His Ala Val Pro Ala Thr Lys Asp Lys Gly Leu Thr Gly
            405   410   415
Ser Ser Val Thr Ser Leu His Ala Lys Thr Phe Ile Val Asp Gly Lys
        420   425   430
Arg Ile Phe Ile Gly Ser Phe Asn Leu Asp Pro Arg Ser Ala Arg Leu
        435   440   445
Asn Thr Glu Met Gly Val Val Ile Glu Ser Pro Lys Ile Ala Glu Gln
    450   455   460
Met Glu Arg Thr Leu Ala Asp Thr Ser Pro Glu Tyr Ala Tyr Arg Val
465   470   475   480
Thr Leu Asp Arg His Asn Arg Leu Gln Trp His Asp Pro Ala Thr Arg
            485   490   495
Lys Thr Tyr Pro Asn Glu Pro Glu Ala Lys Leu Trp Lys Arg Ile Ala
            500   505   510
Ala Lys Ile Leu Ser Leu Leu Pro Ile Glu Ser Leu Leu
        515   520   525

22

```
<210> 21
<211> 15
<212> PRT
<213> Neisseria gonorrhoeae

<400> 21
Arg Arg Met His Asn Lys Ser Phe Thr Ala Asp Asn Arg Ala Cys
 1               5                  10                  15


<210> 22
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> A synthetic primer used in a PCR.

<400> 22
ggtggtcata tgatgcatac agaccccaaa at                                32


<210> 23
<211> 42
<212> DNA
<213> Artificial Sequence

<220>
<223> A synthetic primer used in a PCR.

<400> 23
ggtggttgct cttccgcata ataaaccttc ttcgatgggc ag                    42


<210> 24
<211> 1561
<212> DNA
<213> Neisseria gonorrhoeae

<400> 24
taataaactt tctatgggca gcagggatag gatttttgcg gcgatgcgtt tccaaagttt     60
ggcttcgggt tcgttcgggt aggtttttcg ggtggcggga tcgtgccatt gcaggcggtt    120
gtgcctgtcg agggtaacgc ggtaggcgta ttcgggtgag gtatcggcaa gggtgcgctc    180
catctgttct gcgattttgg ggctttcgat aacaacgccc atttcagtat tgagccgtgc    240
ggaacggggg tcgaggttga atgagccgat gaagatgcgt ttgccgtcca caatgaaggt    300
tttggcatgc aggctggtta cggagctgcc ggtcaggcct ttgtcttttg tggcagggac    360
ggcatggttg ggttgcagct cgtagagttt gatgccggct ttgagcagcg gttttcggta    420
tttgacatag ccggaatgga cggcggcaac gtcggtcgcc tgtagcgagt tggtcaggac    480
ggtaacgtct atgccgtcct gcaccagttt tgccagtgcg tctgtgccgg attttgtggg    540
gacgaaatag ggtgaaacca gatagacgct tttttcgggc tgtttgagcg cgtcttgcag    600
ccgcccggca tcggcggtt  tgcggcggtc gcggtcgagt ccttttgcag ggtcgtcgct    660
gatgaggcgg gtttggacgc tctgccagtc gatgcgtcct gtctgtattt tttggtagag    720
gggcgactgt tcgacggttt cgcggtagcg caggagcgcg tgtctggacg tttcgtcgtt    780
gtatccgagt gcttgaagac ccttgccgat gttgccgctg cggatgatgc gcgtggcgtt    840
gtgggcggaa tggcttgccc agtagcggtc gaagtcgtgc gatacttcgc cgacgacgct    900
gccggtggcg aggatgtcca ggtcggcgaa aacggtgtcc tcaccgactt tgaagtattc    960
gtcgccgata ttgcgtccgc cgagtatggt ggcgcggttg tcggcggtaa aggatttgtt   1020
gtgcatgcgg cggttgaggc gggggaagtc ggtcaggtag ccgagtgcgc gccattttcg   1080
taagacgaag gggttgaaca ggcgcacttc gatattggga tggctgtcga gggcgagcag   1140
gaggtcgtcc aatccgcgcg tgttgttgtc gtccaacagc aggcgtacgc gcacaccgcg   1200
ttctgcggca aggtacacga ggttgaacag cagtcggccg gaaatgtcgt tgcgccagat   1260
gtagtattgc aaatcgaggc tgtgttcggc agattcgata agggcggcgc gggcggcaaa   1320
ggcttcgtgg gggtcgttca acagatagat atcggatagc ccgttggtat gaggggtgtg   1380
ccggatttgc aggatgttgt ccaggcggac gggtttggaa gtattgaaat gacggctttc   1440
cgtccgttct tccagtgggg gcaaccatga agaacatgaa cagagaagga ggcataaaag   1500
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ggaaattagg ctgcgtgttt tcatcaggga tatggtttca gacggcattg cctgtgtttt   1560
g   1561

<210> 25
<211> 1563
<212> DNA
<213> Neisseria gonorrhoeae

<400> 25
caaaatacag gcaatgccgt ctgaaactat atccccgatg aaaacacgca gcctcatttc   60
ccttttatgc ctccttctct gttcatgttc ttcatggttg cccccactgg aagaacggac   120
ggaaagccgt cattttaata cttccaaacc tgtcctcctg gacaacatcc tgcaaatccg   180
gcacacccct cataacaacg ggctatccga catctacctg ctcgacgacc cccacgaagc   240
ctttgccgcc cgcgccgccc ttatcgaatc tgccgaacac agcctcgatt tgcaatacta   300
catttggcgc aacgacattt ccggcaggct gctgttcaac ctcatgtacc ttgccgcaga   360
acgcggcgtg cgcgtacgcc tgctgttgga cgacaacaac acgcgcggct tggacgatct   420
cctgctcgcc ctcgacagcc atcccaatat cgaagtgcgc ccgttcaacc ccttcgtcct   480
acgcaaatgg cgcgcactcg gctacctgac cgacttcccc cgcctcaacc gccgcatgca   540
caacaaatcc tttaccgccg acaaccgcgc caccatactc ggcggacgca atatcggcga   600
cgaatacttc aaagtcggtg aggacaccgt tttcgccgac ctggacatcc tcgccaccgg   660
cagcgtcgtc ggcgaagtat cgcacgactt cgaccgctac tgggcaagcc attccgccca   720
caacgccacg cgcatcatcc gcagcggcaa catcggcaag ggtcttcaag cactcggata   780
caacgacgaa acatccagac acgcgctcct gcgctaccgg gaaaccgtag aacagtcgcc   840
cctctaccaa aaatacagac gggacgcatc gactggcaga gcgtccaaac ccgcttgatc   900
agcgacagcc ctgcaaaagg actcgagacc cgcgaccgcc gcaaaccgcg gattgccggg   960
aggctgcaag acgcgctcaa acagcccgaa aaaagcgtct atctggtttc accctatttc   1020
gtccctacaa aatccggcac agacgcactg gcaaaactgg tgcaggacgg catagacgtt   1080
accgtcctga ccaactcgct acaggcgacc gacgttgccg ccgtccattc cggctacgtc   1140
aaataccgaa aaccgctgct caaagccggc atcaaactct acgagctgca acccaaccat   1200
gccgtccccg ccacaaaaga caaaggcctg accggcagct ccgtaaccag cctgcatgcc   1260
aaaaccttca ttgtggacgg caaacgcatc ttcatcggct cattcaacct cgacccccgt   1320
tccgcacggc tcaataccga aatgggcgtc gtcatcgaaa gccccaaaat cgcagaacag   1380
atggagcgca ccctcgccga taccacaccc gaatacgcct accgcgttac cctcgacaaa   1440
cacaaccgcc tgcaatggca cgatcccgcc acccgaaaaa cctacccgaa cgaacccgaa   1500
gccaaacttt ggaaacgcat cgccgcaaaa atcctatccc tgctgcccat cgaaggttta   1560
tta   1563

<210> 26
<211> 1561
<212> DNA
<213> Neisseria gonorrhoeae

<400> 26
caaaatacag gcaatgccgt ctgaaactat atccccgatg aaaacacgca gcctcatttc   60
ccttttatgc ctccttctct gttcatgttc ttcatggttg cccccactgg aagaacggac   120
ggaaagccgt cattttaata cttccaaacc tgtcctcctg gacaacatcc tgcaaatccg   180
gcacacccct cataacaacg ggctatccga catctacctg ctcgacgacc cccacgaagc   240
ctttgccgcc cgcgccgccc ttatcgaatc tgccgaacac agcctcgatt tgcaatacta   300
catttggcgc aacgacattt ccggcaggct gctgttcaac ctcatgtacc ttgccgcaga   360
acgcggcgtg cgcgtacgcc tgctgttgga cgacaacaac acgcgcggct tggacgatct   420
cctgctcgcc ctcgacagcc atcccaatat cgaagtgcgc ctgttcaacc ccttcgtcct   480
acgcaaatgg cgcgcactcg gctacctgac cgacttcccc cgcctcaacc gccgcatgca   540
caacaaatcc tttaccgccg acaaccgcgc caccatactc ggcggacgca atatcggcga   600
cgaatacttc aaagtcggtg aggacaccgt tttcgccgac ctggacatcc tcgccaccgg   660
cagcgtcgtc ggcgaagtat cgcacgactt cgaccgctac tgggcaagcc attccgccca   720
caacgccacg cgcatcatcc gcagcggcaa catcggcaag ggtcttcaag cactcggata   780
caacgacgaa acatccagac acgcgctcct gcgctaccgc gaaaccgtcg aacagtcgcc   840
cctctaccaa aaaatacaga cgggacgcat cgactggcag agcgtccaaa cccgcctgat   900
cagcgacagc cctgcaaaag gactcgaccg cgaccgccgc aaaccgccga ttgccgggag   960
gctgcaagac gcgctcaaac agcccgaaaa aagcgtctat ctggtttcac cctatttcgt   1020
ccctacaaaa tccggcacag acgcactggc aaaactggtg caggacggca tagacgttac   1080
cgtcctgacc aactcgctac aggcgaccga cgttgccgcc gtccattccg gctacgtcaa   1140

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ataccgaaaa ccgctgctca aagccggcat caaactctac gagctgcaac ccaaccatgc      1200
cgtccccgcc acaaaagaca aaggcctgac cggcagctcc gtaaccagcc tgcatgccaa      1260
aaccttcatt gtggacggca aacgcatctt catcggctca ttcaacctcg accccgttc      1320
cgcacggctc aataccgaaa tgggcgtcgt catcgaaagc cccaaaatcg cagaacagat      1380
ggagcgcacc ctcgccgata ccacacccga atacgcctac cgcgttaccc tcgacaaaca      1440
caaccgcctg caatggcacg atcccgccac ccgaaaaacc tacccgaacg aacccgaagc      1500
caaactttgg aaacgcatcg ccgcaaaaat cctatccctg ctgcccatcg aaggtttatt      1560
a                                                                      1561


<210> 27
<211> 1561
<212> DNA
<213> Neisseria gonorrhoeae

<400> 27
caaaatacag gcaatgccgt ctgaaactat atccccgatg aaaacacgca gcctcatttc        60
cctttttatgc ctccttctct gttcatgttc ttcatggttg cccccactgg aagaacggac       120
ggaaagccgt catttcaata cttccaaacc tgtcctcctg gacaacatcc tgcaaatccg       180
gcacacccct cataacaacg ggctatccga catctacctg ctcgacgacc cccacgaagc       240
ccttgccgcc cgcgccgccc ttatcgaatc tgccgaacac agcctcgatt tgcaatacta       300
catttggcgc aacgacattt ccggcaggct gctgttcaac ctcatgtacc ttgccgcaga       360
acgcggcgtg cgcgtacgcc tgctgttgga cgacaacaac acgcgcgggt tggacgatct       420
cctgctcgcc ctcgacagcc atcccaatat cgaagtgcgc ctgttcaacc ccttcgtcct       480
acgcaaatgg cgcgcactcg gctacctgac cgacttcccc cgcctcaacc gccgcatgca       540
caacaaatcc tttaccgccg acaaccgcgc caccatactc ggcggacgca atatcggcga       600
cgaatacttc aaagtcggtg aggacaccgt tttcgccgac ctggacatcc tcgccaccgg       660
cagcgtcgtc ggcgaagtat cgcacgactt cgaccgctac tgggcaagcc attccgccca       720
caacgccacg cgcatcatcc gcagcggcaa catcggcaag ggtcttcaag cactcggata       780
caacgacgaa acatccagac acgcgctcct gcgctaccgc gaaaccgtcg aacagtcgcc       840
cctctaccaa aaaatacaga cgggacgcat cgactggcag agcgtccaaa cccgcctgat       900
cagcgacacc cctgcaaaag gactcgaccg cgaccgccgc aaaccgccga ttgccgggag       960
gctgcaagac gcgctcaaac agcccgaaaa aagcgtctat ctggtttcac cctatttcgt      1020
ccctacaaaa tccggcacag acgcactggc aaaactggtg caggacggca tagacgttac      1080
cgtcctgacc aactcgctac aggcgaccga cgttgccgcc gtccattccg gctacgtcaa      1140
ataccgaaaa ccgctgctca aagccggcat caaactctac gagctgcaac ccaaccatgc      1200
cgtccccgcc acaaaagaca aaggcctgac cggcagctcc gtaaccagcc tgcatgccaa      1260
aaccttcatt gtggacggca aacgcatctt catcggctca ttcaacctcg accccgttc      1320
cgcacggctc aataccgaaa tgggcgtcgt catcgaaagc cccaaaatcg cagaacagat      1380
ggagcgcacc ctcgccgata ccacacccga atacgcctac cgcgttaccc tcgacaaaca      1440
caaccgcctg caatggcacg atcccgccac ccgaaaaacc tacccgaacg aacccgaagc      1500
caaactttgg aaacgcatcg ccgcaaaaat cctatccctg ctgcccatcg aaggtttatt      1560
a                                                                      1561


<210> 28
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> A synthetic primer used in a PCR.

<400> 28
tccatgcaag aatctggttt c                                                 21

<210> 29
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> A synthetic primer used in a PCR.
```

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<400> 29
cgacaatgag cacagactca ca                                                    22


<210> 30
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> A synthetic primer used in a PCR.

<400> 30
ccttcaggat tctgtccaca a                                                     21


<210> 31
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> A synthetic primer used in a PCR.

<400> 31
cctctctcac aaccaattct tc                                                    22



<210> 32
<211> 1575
<212> DNA
<213> Neisseria gonorrhoeae 1291

<400> 32
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cgcagcctca tttcccttt atgcctcctt ctctgttcat gttcttcatg gttgcccca          120
ctggaagaac ggacggaaag ccgtcatttc aatacttcca aacctgtcct cctggacaac          180
atcctgcaaa tccggcacac ccctcataac aacgggctat ccgacatcta cctgctcgac          240
gaccccacg aagcccttgc cgcccgcgcc gcccttatcg aatctgccga acacagcctc          300
gatttgcaat actacatttg gcgcaacgac atttccggca ggctgctgtt caacctcatg          360
taccttgccg cagaacgcgg cgtgcgcgta cgcctgctgt tggacgacaa caacacgcgc          420
gggttggacg atctcctgct cgccctcgac agccatccca atatcgaagt gcgcctgttc          480
aaccccttcg tcctacgcaa atggcgcgca ctcggctacc tgaccgactt cccccgcctc          540
aaccgccgca tgcacaacaa atcctttacc gccgacaacc gcgccaccat actcggcgga          600
cgcaatatcg gcgacgaata cttcaaagtc ggtgaggaca ccgttttcgc cgacctggac          660
atcctcgcca ccggcagcgt cgtcggcgaa gtatcgcacg acttcgaccg ctactgggca          720
agccattccg cccacaacgc cacgcgcatc atccgcagcg gcaacatcgg caagggtctt          780
caagcactcg gatacaacga cgaaacatcc agacacgcgc tcctgcgcta ccgcgaaacc          840
gtcgaacagt cgcccctcta ccaaaaaata cagacgggac gcatcgactg gcagagcgtc          900
caaacccgcc tgatcagcga caccctgca aaaggactcg accgcgaccg ccgcaaaccg          960
ccgattgccg ggaggctgca agacgcgctc aaacagcccg aaaaaagcgt ctatctggtt         1020
tcaccctatt tcgtccctac aaaatccggc acagacgcac tggcaaaact ggtgcaggac         1080
ggcatagacg ttaccgtcct gaccaactcg ctacaggcga ccgacgttgc cgccgtccat         1140
tccggctacg tcaaataccg aaaaccgctg ctcaaagccg gcatcaaact ctacgagctg         1200
caacccaacc atgccgtccc cgccacaaaa gacaaaggcc tgaccggcag ctccgtaacc         1260
agcctgcatg ccaaaacctt cattgtggac ggcaaacgca tcttcatcgg ctcattcaac         1320
ctcgacccc gttccgcacg gctcaatacc gaaatgggcg tcgtcatcga aagccccaaa         1380
atcgcagaac agatggagcg caccctcgcc gataccacac cgaatacgc ctaccgcgtt         1440
accctcgaca aacacaaccg cctgcaatgg cacgatcccg ccacccgaaa aacctacccg         1500
aacgaacccg aagccaaact ttggaaacgc atcgccgcaa aaatcctatc cctgctgccc         1560
atcgaaggtt tatta                                                          1575
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